CYTOLOGICAL RESEARCH AND BIOPHYSICS

Submicroscopic Morphology of Protoplasm and its Derivatives

By Prof. A. Frey-Wyssling. Translated by Prof. J. J. Hermans and Miss M. Hollander. Pp. viii+255. (New York and Amsterdam: Elsevier Publishing Co., Inc.; London: Cleaver-Hume Press, Ltd., 1948.) 32*s.* 6*d.*

THE second edition of Prof. Frey-Wyssling's book is, as would be expected, a most stimulating work. It comprises three sections. The first is concerned with methods for investigating submicroscopic morphology, such as X-radiation, polarized light, and electron microscope techniques. The second enters into numerous aspects of our knowledge of cell structure. The third covers structures such as cellulose and keratin, and some of their relationships with the cells which give rise to them. All this is very much from Prof. Frey-Wyssling's own point of view, expressed clearly and vigorously. It is much to be regretted that the standard of translation from the German lacks literary quality: the sentence construction is awkward and the volume is lavishly scattered with words not hitherto found in the English language. Although these defects never hide the author's meaning completely, they do hamper an appreciation of his clear flow of thought.

One of the main themes is the extent to which the properties of cells and their constituent parts are determined by elongated molecules and particles. It is suggested that even the properties of the more fluid part of protoplasm are to be explained in terms of the presence of such bodies, and the perpetual formation and breakdown of junctions between them. This is a point of view which can scarcely be accepted with the scanty evidence we have available; and on many, if not most, of the problems studied more views exist than are given in this book. But it is a point of view worthy of its able exponent.

There is comparatively little discussion of the role of long-range forces in the cell, though for the type of system emphasized these forces are likely to be of great importance. The forces acting between chromosomes in meiosis and mitosis present one extreme case, in which the distance over which the forces appear to act is of the order of micra, whereas between small protein molecules the critical distances are of the order of millimicra. One of the major difficulties in advancing our knowledge of cells is our lack of understanding of the nature of the forces which are important over distances of those orders of magnitude. Thus the type of investigation which is particularly suggested by this book is likely to be brought to a stop unless there are marked advances in this branch of biophysics. The same is true of other branches of cytology: cell permeability awaits a more adequate physical theory of diffusion; cell electrophysiology depends upon a more detailed understanding of thin films and membranes; cytochemistry waits upon advances in the field of optics, and so on.

The branches of physics which are involved are, for the most part, those which are not of importance in nuclear physics and electronics, which are attracting the lion's share of the interest and energies of physicists these days. It is thus more than ever necessary that departments of biophysics should be developed, which shall be sufficiently powerfully staffed to carry out fundamental research in those branches of physics and physical chemistry which are necessary for cytology. This policy has proved an outstanding success in the similar field of biochemistry; for example, the significance of phosphorylation and phosphorylation cycles, which ranks of the first importance in modern cell physiology, would never have been grasped had it not been for the existence of groups of biochemists capable of undertaking fundamental chemical investigations. One of the clearest conclusions to be drawn from Prof. Frey-Wyssling's book is that, without a rapid development of biophysics, a large part of cytological research must come to a halt, and much of biochemistry will be delayed in its application to cytology until the physical problems are solved.

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THE ENGINEER'S APPROACH TO ELECTRICITY AND MAGNETISM

Elements of Electrical Engineering

By Prof. Walter J. Creamer. Pp. ix+344. (New York and London: McGraw-Hill Book Co., Inc., 1948.) 24*s.*

THIS is an interesting and somewhat unusual type of introductory text-book to the study of electrical engineering. Its express purpose is to introduce the engineering approach to the study of electricity and magnetism to students already possessing an elementary knowledge of the mathematical and physical principles, and the scope of the book has been determined quite rigorously by this consideration. With one or two minor exceptions, only D.C. phenomena are treated; but the student is presumed to be aware of some of the general features of alternating current systems.

It is noteworthy that, as a result of this limitation of the field, many quite important matters not ordinarily dealt with in elementary text-books have found a place. For example, the star-delta transformation is treated in the chapter on the electric circuit, and the superposition principle is illustrated, although, oddly enough, it is not utilized in the demonstration of Thévenin's theorem. Chapter 3, on conductors and insulators, includes a paragraph on non-linear circuit elements. The measurement of ground resistance receives attention in the chapter on measuring networks, and electrolytic corrosion under electro-chemical principles. In the treatment of the magnetic circuit, trial and error methods are applied to the calculation of branched magnetic circuits.

Generally speaking, the material used to illustrate the engineering approach is judiciously chosen and well presented, and a satisfactory link is made with the underlying physical concepts. There are, however, examples of statements which might confuse rather than clarify the thoughts of the beginner. On page 9, for example, in relation to current density it is stated that "the distribution of current over the cross-section of a homogeneous conductor will not be uniform if the conductor lies close to another conductor carrying a large current", as though this were a phenomenon of significant magnitude on D.C.; then